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NIXON PEABODY, LLP
401 9TH STREET, NW
SUITE 900
WASHINGTON, DC 20004-2128

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/619,005

Applicant(s)

ABE ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2003.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-22 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

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DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6, 8-14 and 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese document 09-161845 (hereinafter referred to as "*the JP '845*").

The present application is directed to a non-aqueous electrolytic solution wherein the claimed inventive concept comprises the specific nitrile compound and sulfur-containing compound. A lithium battery is also intended.

Concerning claim 1:

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The JP'845 discloses a non-aqueous electrolyte secondary battery comprising a non-aqueous electrolyte solution (TITLE) including organic solvents and a lithium compound dissolved (*the electrolyte*) therein (ABSTRACT). The JP'845 discloses the use of nitrile compounds in the electrolytic solution (SECTION 0015) including at least acetonitrile, propionitrile, succinonitrile, glutaronitrile (SECTION 0025-0026). **EXAMPLES 5-6** exemplified the use of nitrile compounds including propionitrile and glutaronitrile in electrolytic solutions (EXAMPLES 5-6). Additionally, the JP'845 also discloses the use of dimethylsulfite (COMPARATIVE EXAMPLE 3) and sulfolane (EXAMPLE 7). The JP'845 clearly discloses that all of the solvents can be used alone or in combination, that is, mixture thereof (SECTION 0026, 0015, 0002). *Thus, the JP '845 at once envisage the combined use of the aforementioned electrolyte solvents.*

As for claims 2-3:

The JP'845 discloses the use of nitrile compounds in the electrolytic solution (SECTION 0015) including at least acetonitrile and propionitrile (SECTION 0025-0026). **EXAMPLE 5** exemplified the use of nitrile compounds including propionitrile in electrolytic solutions (EXAMPLE 5).

With respect to claims 4-5:

The JP'845 discloses the use of nitrile compounds in the electrolytic solution (SECTION 0015) including at least succinonitrile and glutaronitrile (SECTION 0025-0026). **EXAMPLE 6** exemplified the use of nitrile compounds including glutaronitrile in electrolytic solutions (EXAMPLE 6).

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Regarding claim 6 and 8:

The JP'845 specifically discloses the use of dimethylsulfite contained in an amount of 17 vol % (COMPARATIVE EXAMPLE 3) and sulfolane in an amount of 22 vol % (EXAMPLE 7). *Thus, it is disclosed with sufficient specificity.*

Examiner's note: it is noted that the limitation "4 wt % or less" does include 0 (zero) as a lower limit. Thus, the foregoing limitation also reads on "*free of S=O group containing compound*" or "*0 weight % at all*". (See MPEP 2173.05(c) *Numerical Ranges & Amounts Limitations, II. Open-Ended Numerical Ranges*).

With reference to claim 9:

EXAMPLES 5-6 exemplified the use of nitrile compounds including propionitrile in an amount of 17.8 vol %; and glutaronitrile in an amount of 19 vol % of the electrolytic solutions (EXAMPLES 5-6).

The JP'845 specifically discloses the use of dimethylsulfite contained in an amount of 17 vol % (COMPARATIVE EXAMPLE 3) and sulfolane in an amount of 22 vol % (EXAMPLE 7).

With respect to claim 11:

Disclosed is the use of cyclic carbonate such as propylene carbonate, ethylene carbonate and the likes; cyclic ester such as γ -butyrolactone; linear carbonate such as dimethyl carbonate, diethyl carbonate, ethyl methyl carbonate; and/or ether such as tetrahydrofuran and the likes (SECTION 0002, SECTION 0002, 0015, 0020, 0024-0026/ EXAMPLES 1-8 & COMPARATIVE EXAMPLES 1-4).

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On the matter of claims 12-14:

EXAMPLES 1-8 and **COMPARATIVE EXAMPLES 1-4** show the combined use of linear carbonate with cyclic carbonates or a cyclic ester or an ether including the following volume percents: 20:80 vol %, 50:50 vol %; 18:82 vol %; 30:70 vol %; 17:83 vol %; 25:75 vol %; 17.8:82.2 vol %; 19:81 vol %; 22:78 vol %. *Thus, the specific volume ratios are disclosed with sufficient specificity. Additionally, it is noted that since the claimed volume ratios do also encompass a large range of possible volume ratios (i.e. 1:9 to 9:1 or 1:99 to 99:1), the JP'845 also meet the specific claimed requirement.* Lastly, given that the JP'845 clearly discloses that all of the solvents can be interchangeably used or used in combination, that is, any mixture thereof (SECTION 0026, 0015, 0002). *Thus, the volume ratios disclosed in EXAMPLES 1-8 and COMPARATIVE EXAMPLES 1-4 are equally applicable to any combination of solvents.*

With regard to claims 21-22:

The JP'845 teaches lithium batteries (SECTION 0001-0002/ABSTRACT) comprising a positive electrode and a negative electrode (ABSTRACT) wherein the negative electrode is a carbonaceous materials having a d_{002} lattice distance of 0.3365 nm or more (SECTION 0009 & 0012).

Thus, the claims are anticipated.

5. Claim 1 is (*at least*) rejected under 35 U.S.C. 102(e) as being anticipated by Jouanneau et al 2005/0026041.

Jouanneau et al teach a solvent of an electrolyte which can be composed of one or more polar aprotic compounds chosen from linear or cyclic carbonates, linear or cyclic ethers, linear or

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cyclic esters or cyclic sulfones, sulfamides and nitriles (SECTION 0027). Disclosed is also the electrolyte (SECTION 0030-0031).

Thus, the claim is anticipated.

6. Claims 1-3 (*at least*) rejected under 35 U.S.C. 102(e) as being anticipated by Ito et al 2003/0054258.

Ito et al makes known a non-aqueous electrolyte (SECTION 0025) including a salt (SECTION 0025-0026) and solvents to be used in the non-aqueous electrolyte including solvents such as nitrile type solvents, ester type, sulfur type solvent, and linear ether solvents, among others (SECTION 0030). Ito et al teach the use of a plurality of solvents (SECTION 0038). Examples of nitrile type solvent are acetonitrile, propionitrile (SECTION 0034). Examples of sulfur type solvents are dimethylsulfoxide and sulfolane (SECTION 0036).

Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese document 09-161845 (hereinafter referred to as "*the JP '845*") as applied to claim 1 above, and further in view of Gagne et al 4475994.

The JP'845 is applied, argued and incorporated herein for the reasons above. However, the preceding reference does not expressly disclose the specific nitrile amount.

Gagne et al disclose an electrochemical cell (ABSTRACT) comprising an aprotic solvent containing a dissolved salt (COL 3, lines 61-64) wherein nitriles such as succinonitrile, adiponitrile among others are added to the electrolyte in an amount of at least about 1 % by weight of thereof to the total weight of the electrolyte solution to stabilize the electrolyte.

With these references, it would have been obvious to one skilled in the art at the time the invention was made to use the specific nitrile amount of Gagne et al in the battery of the JP'845 because Gagne et al teaches that nitriles are added to the electrolyte in the claimed amount to stabilize the electrolyte. Thus, the specific nitrile amount provides improved chemical stability. *In this particular, the teachings of Gagne et al are found pertinent and applicable to the teachings of the JP '845 and the field of applicant's endeavor as Gagne et al is strictly concerned with the addition of nitrile to electrolyte to stabilize it regardless of the specific chemical system (i.e. organic or aqueous), and thus, one of ordinary skill in the art would have easily arrived at the claimed invention by simply looking at the teachings of Gagne et al.*

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10. Claims 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese document 09-161845 (hereinafter referred to as "*the JP '845*") in view of Gagne et al 4475994.

Concerning claims 15-16:

The JP'845 discloses a non-aqueous electrolyte secondary battery comprising a non-aqueous electrolyte solution (TITLE) including organic solvents and a lithium compound dissolved (*the electrolyte*) therein (ABSTRACT). The JP'845 discloses the use of dinitrile compounds in the electrolytic solution (SECTION 0015) including at least succinonitrile and glutaronitrile (SECTION 0025-0026). **EXAMPLE 6** exemplified the use of glutaronitrile in electrolytic solutions (EXAMPLE 6). The JP'845 clearly discloses that all of the solvents can be used alone or in combination, that is, mixture thereof (SECTION 0026, 0015, 0002). *Thus, the JP'845 at once envisage the combined use of the aforementioned electrolyte solvents.*

EXAMPLES 5-6 exemplified the use of nitrile compounds including propionitrile in an amount of 17.8 vol %; and glutaronitrile in an amount of 19 vol % of the electrolytic solutions (EXAMPLES 5-6).

With respect to claim 17:

Disclosed is the use of cyclic carbonate such as propylene carbonate, ethylene carbonate and the likes; cyclic ester such as γ -butyrolactone; linear carbonate such as dimethyl carbonate, diethyl carbonate, ethyl methyl carbonate; and/or ether such as tetrahydrofuran and the likes (SECTION 0002, SECTION 0002, 0015, 0020, 0024-0026/ EXAMPLES 1-8 & COMPARATIVE EXAMPLES 1-4).

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On the matter of claims 18-20:

EXAMPLES 1-8 and **COMPARATIVE EXAMPLES 1-4** show the combined use of linear carbonate with cyclic carbonates or a cyclic ester or an ether including the following volume percents: 20:80 vol %, 50:50 vol %; 18:82 vol %; 30:70 vol %; 17:83 vol %; 25:75 vol %; 17.8:82.2 vol %; 19:81 vol %; 22:78 vol %. *Thus, the specific volume ratios are disclosed with sufficient specificity. Additionally, it is noted that since the claimed volume ratios do also encompass a large range of possible volume ratios (i.e. 1:9 to 9:1 or 1:99 to 99:1), the JP'845 also meet the specific claimed requirement.* Lastly, given that the JP'845 clearly discloses that all of the solvents can be interchangeably used or used in combination, that is, any mixture thereof (SECTION 0026, 0015, 0002). *Thus, the volume ratios disclosed in EXAMPLES 1-8 and COMPARATIVE EXAMPLES 1-4 are equally applicable to any combination of solvents.*

The JP'845 disclose an electrolytic solution according to the foregoing aspects. However, the preceding prior art does not expressly disclose the specific nitrile amount.

Gagne et al disclose an electrochemical cell (ABSTRACT) comprising an aprotic solvent containing a dissolved salt (COL 3, lines 61-64) wherein nitriles such as succinonitrile, adiponitrile among others are added to the electrolyte in an amount of at least about 1 % by weight of thereof to the total weight of the electrolyte solution to stabilize the electrolyte.

With these references, it would have been obvious to one skilled in the art at the time the invention was made to use the specific nitrile amount of Gagne et al in the battery of the JP'845 because Gagne et al teaches that nitriles are added to the electrolyte in the claimed amount to stabilize the electrolyte. Thus, the specific nitrile amount provides improved chemical stability. *In this particular, the teachings of Gagne et al are found pertinent and applicable to the*

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teachings of the JP '845 and the field of applicant's endeavor as Gagne et al is strictly concerned with the addition of nitrile to electrolyte to stabilize it regardless of the specific chemical system (i.e. organic or aqueous), and thus, one of ordinary skill in the art would have easily arrived at the claimed invention by simply looking at the teachings of Gagne et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745


RAYMOND ALEJANDRO
PRIMARY EXAMINER